## CLAIMS

1. A method of automatically inspecting matter for varying composition, comprising advancing a stream of said matter through a detection station (131), emitting a detection medium to be active at a transverse section of said stream at said detection station (131), wherein said medium is varied by variations in the composition of said matter at said transverse section, receiving the varied medium at receiving means (7; 107; 139), and generating detection data in dependence upon the variations in said medium, characterised in that said varied medium is received over substantially the width of the stream by said receiving means (7; 107; 139) which physically extends across substantially the width of said stream.

2. A method according to claim 1, wherein said emitting occurs at a location significantly spaced from said receiving means (7; 107; 139).

3. A method according to claim 1 or 2, wherein said emitting occurs over substantially the width of said stream.

4. A method according to any preceding claim, wherein said transverse section comprises a multiplicity of individual detection zones distributed across substantially the width of said stream.

5. A method according to any preceding claim, wherein said detection medium comprises electromagnetic radiation which irradiates said section, said generating including determining the intensity of electromagnetic radiation of selected wavelength(s) reflected from portions (125) of said stream distributed across said stream.

6. A method according to claim 5, wherein said portions (125) comprise polymer and said selected wavelengths comprise a plurality of wavelength bands in the region 1.5 microns to 1.85 microns.

7. A method according to claim 5 or 6, wherein said receiving means (7; 107; 139) receives from said stream diffusely reflected said electromagnetic radiation travelling substantially perpendicularly to a widthwise and lengthwise plane of said stream.

8. A method according to claim 5, 6, or 7, as appended to claim 4, wherein said determining is performed for each

detection zone in respect of a plurality of wavelengths simultaneously.

9. A method according to claim 5, 6 or 7, as appended to claim 4, wherein said electromagnet radiation is supplied as pulses to each detection zone in a frequency multiplexed manner.

10. A method according to claim 5, 6, or 7, as appended to claim 4, wherein said determining is performed for each detection zone in respect of a plurality of said wavelengths in a time multiplexed manner.

11. A method according to any one of claims 5 to 10, wherein portions of said stream are substantially transparent to said electromagnetic radiation and said stream is advanced on a supporting surface (4, 104) which is diffusely reflective of said electromagnetic radiation.

12. A method according to any one of claims 5 to 10, wherein said matter comprises laminate (125, 186) comprised of a first layer (184) and a second layer (180) underneath said first layer (184) and of a material having a spectrum of reflected said electromagnetic radiation significantly different from that of the material of the first layer (184).

13. A method according to claim 12, wherein said stream of matter is a continuous strip of laminate (186) advancing on a laminating machine and said detection data is utilised to control the laminating process performed on said machine.

14. A method according to claim 13, wherein said first layer (184) is a coating of a polymer and said second layer (180) is a substrate (180) and variation in the composition of said first layer (184) is detected at said detecting station (131) and said detection data is utilised to control the coating process in said machine.

15. A method according to claim 14, wherein said variation in composition is variation in thickness of said first layer.

16. A method according to any one of claims 1 to 12, and further comprising utilising said detection data to separate from said stream a stream fraction comprised of desired portions (125) of said stream.

17. A method according to claim 16, wherein said stream

comprises solid food.

18. A method according to claim 17, wherein said solid food comprises higher-quality discrete portions and lower-quality discrete portions and said detection data is utilised to separate the stream into a higher-quality fraction and a lower-quality fraction, one of which fractions is comprised of said desired portions (125).

19. A method according to claim 16 as appended to claim 12, wherein said stream fraction comprises said laminate (125) as said desired portions (125).

20. A method according to claim 19, wherein said stream of matter is a stream of waste including said laminate (125) in the form of polymer-coated paperboard objects (125) and said determining is solely as to whether a portion of said waste is or is not a polymer-coated paperboard object (125), said stream fraction being comprised of the polymer-coated paperboard objects (125) as said desired portions (125).

21. A method according to claim 20, wherein said polymer is polyethylene, said substrate is paperboard and one of said wavelengths is in a band centred on substantially 1.7 microns.

22. A method according to claim 16, 19, 20, or 21, as appended to claim 5, and further comprising separating from said stream by means of eddy current ejection a second fraction comprised of metal portions.

23. A method according to any one of claims 1 to 4, wherein said detection medium comprises an electromagnetic field which induces eddy currents in metal portions of said stream at said detection station.

24. A method according to claim 23, and further comprising utilising said detection data to separate from said stream a stream fraction comprised of said metal portions as said desired portions.

25. A method according to any one of claims 19 to 21, and further comprising advancing said stream through a metal-detection station (131) including a multiplicity of metal-detection zones distributed across said stream, inducing eddy currents in metal portions of said stream at said metal-detection station, producing electrical signals in dependence on said eddy currents, and utilizing said

detection data in the form of said electrical signals in separating from said stream a stream fraction comprised of said metal portions as other desired portions.

26. A method according to any one of claims 19 to 25, and further comprising simultaneously cycling through the method, including advancing through the detection station(s) (131), another stream of matter, and utilizing the detection data obtained from said other stream in separating therefrom another fraction comprised of further desired portions.

27. A method according to claim 26, wherein the first-mentioned stream and said other stream are advanced in a common direction through said detection station.

28. A method according to claim 26, wherein the first-mentioned stream and said other stream are advanced in respective opposite directions through said detection station.

29. A method according to any one of claims 16 to 28, wherein the separating comprises causing air jet pulses to impinge upon said desired portions to force the same out of the stream(s).

30. A method according to claim 29, wherein said advancing is relatively fast and said air jet pulses are relatively weak.

31. A method according to any one of claims 26 to 28, or claim 28 or 29 as appended to claim 25, wherein said other stream comprises the separated-out fraction(s) of the first-mentioned stream.

32. A method according to any one of claims 26 to 28, or claim 29 or 30 as appended to claim 26, wherein said other fraction consists predominantly of a material of a differing constituency from that of the separated-out fraction(s) of the first-mentioned stream.

33. Apparatus for automatically inspecting matter for varying composition, comprising advancing means (4; 104; 185) for advancing a stream of said matter, a detection station (131) through which said advancing means (4; 104; 185) advances said stream, emitting means (5; 105; 138) serving to emit a detection medium to be active at a transverse section of said stream at said station (131), receiving means (7; 107; 139) at said station (131) serving

to receive detection medium varied by variations in the composition of said matter at said section and detecting means (14;114; 140) serving to generate detection data in dependence upon the variations in said medium, and data-obtaining means (15; 135) connected to said detecting means (14; 114; 140) and serving to obtain said detection data therefrom, characterised in that said receiving means (7; 107) is arranged to extend physically across substantially the width of said stream.

34. Apparatus according to claim 33, wherein said emitting means (5; 105; 138) is significantly spaced from said receiving means (7; 107; 139).

35. Apparatus according to claim 33 or 34, wherein said emitting means (5; 105; 138) is arranged to extend physically across substantially the width of said stream.

36. Apparatus according to claim 33, 34, or 35, wherein said emitting means (5; 105) serves to emit electromagnetic radiation as said detection medium, said detecting means (14; 114; 140) serving to determine the intensity of electromagnetic radiation of selected wavelength(s) reflected from portions (125) of said stream distributed across said stream.

37. Apparatus according to claim 36, wherein said emitting means (105) is arranged to irradiate said portions (125) obliquely relative to a widthwise and lengthwise plane of said stream and said receiving means (107) is arranged to receive from said portions (125) diffusely reflected said electromagnetic radiation travelling substantially perpendicularly to that plane.

38. Apparatus according to claim 36 or 37, wherein said emitting means (5;105) comprises a multiplicity of sources (5;105) of said electromagnetic radiation arranged to be distributed across said stream.

39. Apparatus according to any one of claims 36 to 38, wherein said advancing means (4, 104) has a stream-supporting surface which is diffusely reflective of said electromagnetic radiation.

40. Apparatus according to any one of claims 36 to 39 and included in a laminating machine, said data-obtaining means (135) serving to control the laminating process performed on

said machine.

41. Apparatus according to any one of claims 36 to 39 and further comprising, downstream of said detection station (131), separating means (116) serving to separate from said stream a fraction comprised of desired portions (125) of said stream selected in accordance with said detection data obtained.

42. Apparatus according to claim 41 and further comprising an eddy current ejection arrangement (170) serving to eject metal portions from said stream.

43. Apparatus according to claim 42, wherein said separating means (116) and said eddy current ejection arrangement (170) are disposed one immediately after the other along said advancing means (104).

44. Apparatus according to any one of claims 36 to 43, wherein said receiving means (7; 107) comprises reflecting means (7; 107).

45. Apparatus according to claim 44, wherein said reflecting means (107) comprises a mirror (107) which is substantially arcuate concavely in a plane parallel to the widthwise and lengthwise plane of said stream and which is obliquely inclined to the former plane.

46. Apparatus according to claim 45, wherein said mirror (107) is part of an imaginary, substantially toroidal surface.

47. Apparatus according to claim 44, wherein said reflecting means (107) comprises a multiplicity of reflectors (107a) distributed in a row arranged to extend substantially rectilinearly across said stream, said reflectors (107a) being differingly orientated so as to transmit electromagnetic radiation reflected from a multiplicity of detection zones distributed across said stream at said transverse section.

48. Apparatus according to any one of claims 36 to 47, and further comprising a polygonal mirror (108) interposed between said receiving means (107) and said detecting means (114) and having its reflective faces arranged around an axis of rotation of said polygonal mirror (108).

49. Apparatus according to any one of claims 36 to 43, wherein said receiving means (7) comprises conducting means

(7) for conducting therealong said electromagnetic radiation.

50. Apparatus according to claim 49, wherein said conducting means (7) comprises a multiplicity of optical fibres (7) having their entrances arranged to be distributed across said stream.

51. Apparatus according to any one of claims 36 to 50, and further comprising beam splitting means (122) interposed between said receiving means (107) and said detecting means (114) for said electromagnetic radiation.

52. Apparatus according to any one of claims 33 to 35, wherein said station (131) is a metal-detection station and said emitting means (138) serves to emit an electromagnetic field, said receiving means (139) comprising a multiplicity of electromagnetic field sensing devices (139) arranged to be distributed across said stream.

53. Apparatus according to any one of claims 36 to 51, and further comprising a metal-detection station (131) past which said advancing means (104) advances said stream, another emitting means (138) serving to generate an electromagnetic field, and another receiving means (139) arranged so as to be discretely distributed across said stream at said metal-detection station (131) and serving to detect metal portions of said stream advancing past said metal-detection station (131), and metal-separating means (116) downstream of said metal-detecting means (139) and serving to separate from said stream a fraction comprised of said metal portions.

54. Apparatus according to claim 52 or 53, wherein said emitting means (138) which serves to generate an electromagnetic field comprises an antenna (138) extending across said advancing means (104) at said metal-detection station (131), said advancing means (104) being situated between said antenna (138) and said receiving means (139) for the field.

55. Apparatus according to claim 41, 42, or 43, or any one of claims 44 to 54 as appended to claim 41, wherein said advancing means (104) comprises a substantially planar conveying surface and said separating means (116) is carried by an auxiliary conveying means (127) positionable at said

conveying surface to lift said stream from said conveying surface and forward said stream to said separating means (116).

56. Apparatus according to any one of claims 33 to 55, and further comprising second advancing means (104) serving to advance another stream of matter through the detection station(s) (131), said receiving means (7;107;139) serving also to receive detection medium varied by variations in the composition of the matter of said other stream at a transverse section of said other stream, said detecting means (14,114;140) serving also to generate detection data in dependence upon the latter variations in said medium, said data-obtaining means (15,135) serving also to obtain said detection data in respect of said other stream.

57. Apparatus according to claim 56, wherein said second advancing means (104) is arranged to advance said other stream through the detection station(s) 131 in substantially the same direction as that in which the first-mentioned advancing means (104) is arranged to advance the first-mentioned stream through the detection station(s) (131).

58. Apparatus according to claim 57, wherein said first-mentioned advancing means (104) and said second advancing means (104) take the form of a single conveyor (104).

59. Apparatus according to claim 58, wherein said single conveyor (104) includes a single conveying belt (104).

60. Apparatus according to claim 58 or 59, wherein said single conveyor (104) has a portion (160) extending therealong to keep the streams apart from each other.

61. Apparatus according to claim 57, wherein said second advancing means (104B) is arranged to advance said other stream through the detection station(s) 131 in substantially the opposite direction to that in which the first-mentioned advancing means (104A) is arranged to advance the first-mentioned stream through the detection station(s) (131).

62. Apparatus according to any one of claims 56 to 61 as appended to claim 41, and further comprising returning means (164) serving to transport the separated-out fraction(s) of the first-mentioned stream to said second advancing means (104B) upstream of said detection station(s) (131) to constitute said other stream.

63. Apparatus according to any one of claims 56 to 62, wherein said separating means (116) serves also to separate another fraction from said other stream.

64. Apparatus according to claim 41, 42, 43, 53, or 63, wherein the separating means (116) comprises one or more rows of air jet nozzles (116) arranged transversely of the advancing means (104).

65. A method of automatically inspecting matter for varying composition, comprising advancing a stream of said matter through a detection station (131), irradiating with electromagnetic radiation comprising substantially invisible electromagnetic radiation a section of said stream at said station (131), scanning said section and determining the intensity of substantially invisible electromagnetic radiation of selected wavelength(s) reflected from portions of said stream, and obtaining detection data from said detection station (131), characterised in that said scanning is performed in respect of a plurality of discrete detection zones distributed across said stream and in that said determining is performed for each detection zone in respect of a plurality of said wavelengths simultaneously.

66. A method according to claim 65, wherein portions of said stream comprise polymer and said plurality of wavelengths comprise a plurality of wavelength bands in the region 1.5 microns to 1.85 microns.

67. A method of separating polymer-coated paperboard objects from a stream of waste, comprising advancing said stream through a detection station (131) and separating the polymer-coated paperboard objects (125) from the stream, characterised in that at said station (131) a determination is made, using substantially invisible electromagnetic radiation, solely as to whether a portion of said waste is or is not a polymer-coated paperboard object (125).

68. A method of automatically inspecting matter for varying composition, comprising advancing through a detection station (131) a first stream of matter, obtaining from said detection station (131) first detection data as to a constituent of said first stream, characterised by advancing a second stream of matter through said detection station (131) simultaneously with said first stream, and obtaining

from said detection station (131) second detection data as to a constituent of said second stream.

69. A method according to claim 68, wherein the first and second streams are advanced in a common direction through said detection station (131).

70. A method according to claim 68, wherein the first and second streams are advanced in respective opposite directions through said detection station (131).

71. A method according to any one of claims 68 to 70, and further comprising utilising the first and second detection data to separate from the respective first and second streams respective first and second fractions comprised of said constituent of said first stream and said constituent of said second stream, respectively.

72. A method according to claim 71, wherein the first fraction constitutes the second stream.

73. A method according to any one of claims 68 to 72, wherein said constituent of said first stream is of substantially the same composition as said constituent of said second stream.

74. A method according to any one of claims 68 to 72, wherein said constituent of said first stream is of a significantly different composition from said constituent of said second stream.

75. Apparatus for automatically inspecting matter for varying composition, comprising a detection station (131), first advancing means (104) serving to advance through said station (131) a first stream of matter, and detecting means (4; 114; 140) serving to produce first detection data as to a constituent of said first stream at said station (131), characterised by second advancing means (104) serving to advance a second stream of matter through said station (131) simultaneously with said first stream, and said detecting means (4; 114; 140) serving to produce second detection data as to a constituent of said first stream.

76. Apparatus according to claim 75, wherein the first and second advancing means (104) are arranged to advance the first and second streams through said detection station (131) in a common direction.

77. Apparatus according to claim 76, wherein the first and

second advancing means (104) take the form of a single conveyor (104).

78. Apparatus according to claim 77, wherein said single conveyor (104) includes a single conveying belt (104).

79. Apparatus according to claim 77 or 78, wherein said single conveyor (104) has a partition (160) extending therealong to keep the streams apart from each other.

80. Apparatus according to claim 75, wherein the first and second advancing means (104A, 104B) are arranged to advance the first and second streams in respective opposite directions through said detection station (131).

81. Apparatus according to any one of claims 75 to 79, and further comprising returning means (164) serving to transport to said second advancing means (104) upstream of said station (131) to constitute said second stream a separated-out fraction of said first stream comprised of said constituent of said first stream.

82. Apparatus according to any one of claims 75 to 81 and further comprising radiation-emitting means (5; 105) serving to emit radiation to irradiate respective, substantially aligned, transverse sections of the first and second streams, and radiation receiving means (7; 107) at said station (131) serving to receive radiation reflected from said sections and to communicate the same to said detecting means (4; 114).

83. Apparatus according to claim 82, wherein said radiation emitting means (5; 105) is so arranged as to extend across both of the first and second streams.

84. Apparatus according to claim 83, wherein said radiation emitting means (5;105) comprises a row of radiation sources (5;105).

85. Apparatus according to any one of claims 82 to 84, wherein said receiving means (7;107) is so arranged as to extend across both of the first and second streams.

86. Apparatus according to claim 85, wherein said receiving means (107) comprises radiation-reflecting means (107).

87. Apparatus according to claim 86, wherein said reflecting means (107) comprises a mirror (107) which is substantially arcuate concavely in a plane parallel to a widthwise plane of the first and second streams and which is

obliquely inclined to the former plane.

88. Apparatus according to claim 87, wherein said mirror (107) is part of an imaginary, substantially toroidal surface.

89. Apparatus according to any one of claims 75 to 81, wherein said detecting means (140) communicates with a multiplicity of metal-sensing means (139) arranged so as to be discretely distributed across the first and second streams and serving to detect metal portions constituting the constituent(s) of at least one of the first and second streams.